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(54) INFORMATION RECORDING MEDIUM AS WELL AS APPARATUS AND METHOD FOR AFTERRECORDING WITH RESPECT TO THE INFORMATION RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To judge whether an afterrecording operation can be performed or not during the afterrecording operation by recording an audio stream which can be afterrecorded is recorded and audio-attribute information which contains bit-rate information indicating the bit rate of the audio stream.

SOLUTION: An optical disk is provided with bit-rate information in addition to audio-coding-mode information and audio-channel-number information as the

attribute of a dummy audio stream which is recorded for afterrencording. A DVD recorder uses the audio-attribute information, and it checks in advance whether an afterrecording operation can be performed by using the dummy audio stream. An audio coding mode which is recorded in A ATR1 in M VOB STI, the number of audio channels and a bit rate are compared with the encoding capability of the DVD recorder. Whether an afterrecording operation can be performed or not is checked in advance. When the afterrecording operation cannot be performed, that the afterrecording operation cannot be performed is reported.

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CLAIMS

[Claim(s)]

[Claim 1] The information record medium characterized by recording the audio stream which can be postrecorded, and audio attribute information including the bit rate information which shows the bit rate of this audio stream.

[Claim 2] Two or more audio streams are stored in said information record medium. It is the audio stream of these two or more audio streams which at least one can postrecord. The audio stream which stores the audio data at the time of the aforementioned after recording Since the audio data at the time of after recording are stored, it is the 2nd audio stream prepared for every audio stream [the] which stores original audio data. The information record medium according to claim 1 characterized by having the same attribute as the 1st audio stream.

[Claim 3] Said two or more audio streams are information record media according to claim 2 characterized by the same thing per packet except for stream numbers differing.

[Claim 4] The information recording apparatus which is an information recording apparatus which postrecords to the audio stream recorded on the information record medium according to claim 1, and is characterized by having a prior check means to check whether after recording processing of said information recording apparatus is possible to the audio stream which postrecords based on said audio attribute information before postrecording.

[Claim 5] Said prior check means refers to the bit rate information within the audio attribute information on the audio stream for after recording. A decision means by which said information recording apparatus judges whether encoding processing is possible to said audio stream with the bit rate, and when the encoding processing with the bit rate is possible for said information recording apparatus The information recording apparatus according to claim 4 characterized by said information recording apparatus consisting of a judgment means to judge with after recording processing being possible.

[Claim 6] Said prior check means is an information recording apparatus according to claim 5 characterized by having further an advice means to notify a user of the purport in which after recording actuation is impossible, according to the decision result of said decision means when the encoding

processing with said bit rate is not possible for said information recording apparatus.

[Claim 7] Said decision means is an information recording device according to claim 5 which the audio stream for after recording judges whether it is in the condition which can be postrecorded, and is characterized by performing propriety decision of encoding processing of said information processor succeedingly when an audio stream is in the condition which can be postrecorded.

[Claim 8] Said decision means is an information recording device according to claim 7 characterized by judging whether an audio stream is in the condition which can be postrecorded with reference to this status information including the status information which shows whether the audio stream of said management information is in the condition which can be postrecorded.

[Claim 9] For said decision means, said audio attribute information is an information recording apparatus according to claim 5 characterized by performing propriety decision of the encoding processing to the audio stream of said information recording apparatus with reference to this coding mode information further in addition to said bit rate information including the coding mode information on an audio stream.

[Claim 10] The information record approach which it is the approach of postrecording with an information recording apparatus, and said information recording apparatus judges whether encoding processing is possible to said audio stream with reference to said bit rate information about the audio stream for after recording to the audio stream recorded on the information record medium according to claim 1 with the bit rate, and is characterized by to perform after-recording actuation when encoding processing of said information recording apparatus is possible.

[Claim 11] The information record approach according to claim 10 characterized by notifying a user of the purport in which after recording actuation is impossible when the encoding processing with said bit rate is not possible for an information recording apparatus.

[Claim 12] The information record approach according to claim 11 which judges whether the audio stream for after recording is in the condition which

can be postrecorded, and is succeedingly characterized by performing propriety decision of encoding processing of an information recording device when the audio stream is in the condition which can be postrecorded before performing propriety decision of encoding processing of the above.

[Claim 13] The above-mentioned management information is the information record approach according to claim 12 characterized by judging whether an audio stream is in the condition which can be postrecorded with reference to this status information including the status information which shows whether an audio stream is in the condition which can be postrecorded.

[Claim 14] Said audio attribute information is the information record approach according to claim 10 characterized by performing propriety decision of the encoding processing to the audio stream of said information recording apparatus with reference to this coding mode information further in addition to said bit rate information including the coding mode information on an audio stream.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the equipment and the approach for recording information on the record-medium list for realizing after recording actuation in such an information record medium especially to the record medium about the information record medium which can be written at the large capacity and high speed of an optical disk etc.

[0002]

[Description of the Prior Art] Phase change mold disk DVD-RAM which has the capacity of several GB in the field of the erasable optical disk whose about 650MB was an upper limit appeared. Moreover, the utilization and the interval of MPEG (MPEG 2) which are the coding specification of digital AV data are

expected for DVD-RAM as record / playback media not only in a computer application but AV. That is, spread is predicted as media replaced with the magnetic tape which is the conventional typical AV archive medium.

[0003] (Explanation of DVD-RAM) The densification of a rewritable optical disk progresses, and it does not stop at record of computer data or audio data, but is becoming recordable [image data] in recent years.

[0004] For example, the guide slot on uneven is formed in the signal recording surface of an optical disk from the former. Although the signal was conventionally recorded only on a convex or concave, it became possible to record a signal on both unevenness by the land group recording method. Thereby, twice [about] as many improvement in recording density as this was realized (for example, refer to JP,8-7282,A).

[0005] Moreover, in order to raise recording density, zone CLV which simplifies control of effective CLV (constant linear velocity record), and makes utilization easy is devised and put in practical use (for example, JP,7-93873,A).

[0006] It is a future big technical problem how the engine performance which records AV data containing image data and exceeds the conventional AV equipment greatly, and a new function are realized using the optical disk which aims at these large capacity-ization.

[0007] Record and playback of AV can also consider that an optical disk serves as a subject instead of the conventional tape with the advent of an optical disk rewritable [with such large capacity]. The shift of an archive medium to a disk from a tape has various effects in respect of the function and engine performance of an AV equipment.

[0008] The greatest description in the shift to a disk is large improvement in the random access engine performance. When carrying out random access of the tape temporarily, the time amount of several minute order is usually required for rewinding [of one roll]. This is extraordinarily late compared with the seek time (several 10 or less ms) in optical disk media. Therefore, a tape cannot become a random access device practically.

[0009] With such random access engine performance, distributed record of impossible AV data became possible with the optical disk on the conventional

tape.

[0010] Drawing 34 is the block diagram of the drive equipment of a DVD recorder. As for the encoder section and 16, the optical pickup from which 11 in drawing reads disc data, the switch whose 12 the ECC (error correcting code) processing section and 13 change a track buffer, and, as for 14, changes the I/O to a track buffer, and 15 are [the decoder section and 17] the enlarged drawings of a disk.

[0011] As shown in 17, data are recorded on a DVD-RAM disk by making 1 sector =2KB into a smallest unit. Moreover, error correction processing is performed in the ECC processing section 12 as a 16 sector =1ECC block.

[0012] The track buffer shown in 13 is a buffer for recording AV data with a Variable Bit Rate in order to record AV data on a DVD-RAM disk more efficiently. Since a bit rate (inside Vb of drawing) changes according to the complexity in which that content (if it is video image) has AV data to the R/W rate (inside Va of drawing) to DVD-RAM being a fixed rate, it is a buffer for absorbing the difference of this bit rate. For example, the need is lost when AV data are made into a fixed bit rate like a video CD.

[0013] If this track buffer 13 is used further effectively, it will become possible to carry out discrete arrangement of the AV data on a disk. It explains using drawing 35 .

[0014] Drawing 35 (a) is drawing showing the address space on a disk. As shown in drawing 35 (a), when AV data are divided and recorded on the continuation field of [a1, a2], and the continuation field of [a3, a4], while seeking from a2 to a3, continuation playback of AV data is attained by supplying the data stored in the track buffer to the decoder section. Drawing 35 (b) shows the condition at this time.

[0015] The input from time of day t1 to a track buffer and the output from a track buffer are started, and, as for AV data which started read-out from a1, data are stored only for the part of the rate difference (Va-Vb) of the input rate (Va) to a track buffer, and the output rate (Vb) from a track buffer to the track buffer. This condition continues to a2 (time of day t2). What is necessary is to consume B (t2) accumulated in the track buffer, and just to continue supplying a decoder before the time of day t3 which reads a3 and can be started, if the

amount of data accumulated in the track buffer in the meantime is set to B (t2).

[0016] Even when the amount of data ([a1, a2]) which will be read before seeking if a way of speaking is changed was secured more than the constant rate and seeking occurs, continuation supply of AV data is possible.

[0017] In addition, although data are read from DVD-RAM, namely, this example explained the example in playback, the case of the writing of the data to DVD-RAM, i.e., an image transcription, can be considered the same way.

[0018] Even if the data more than a constant rate will carry out distributed record of the AV data on a disk with DVD-RAM if even continuation record is carried out as mentioned above, continuation playback / image transcription is possible.

[0019] (Explanation of MPEG) Next, AV data are explained. Although stated also in advance, AV data recorded on DVD-RAM use the International Standard called MPEG (ISO/IEC13818).

[0020] Even if it is DVD-RAM which has several GB of large capacity, it cannot be said that it has sufficient capacity to record incompressible digital AV data as it is. Then, the approach of compressing and recording AV data is needed. As a compression method of AV data, MPEG (ISO/IEC13818) has spread through a world widely. By the advance of LSI technology in recent years, the MPEG codec (expanding / compression LSI) has put in practical use. MPEG expanding / compression by the DVD recorder have been attained by this.

[0021] MPEG mainly has the following two descriptions, in order to realize an efficient data compression.

[0022] Blindness in one eye is having taken in the compression method using an inter-frame time amount correlation property besides the compression method using the spatial frequency characteristics currently performed from the former in compression of dynamic-image data. According to MPEG, each frame (in MPEG, it is also called a picture) is classified into three kinds, I picture (coding picture in a frame), P picture (picture which used the reference relation from coding in a frame, and the past), and B picture (picture which used the reference relation from coding in a frame, the past, and the future),

and a data compression is performed by it.

[0023] Drawing 36 is drawing showing the relation of I, P, and B picture. As shown in drawing 36 , refer to nearest I of the past and the future, or the P picture for B picture with reference to I among the past with nearest P picture, or P picture, respectively. Moreover, as shown in drawing 36 , in order that B picture may refer to I of the future, or P picture, the phenomenon in which the order of a display of each picture (display order) and the sequence (cording order) in the compressed data are not in agreement arises.

[0024] The second description of MPEG is the points that the dynamic amount assignment of signs according to the complexity of an image can be performed per picture. It is the decoder of MPEG being equipped with an input buffer and storing data in this decoder buffer beforehand, and it is possible to assign the amount of signs of a large quantity to a difficult compressive complicated image.

[0025] The audio data used with DVD-RAM can be used choosing them from three kinds, the MPEG audio and DORUBI digital (AC-3) which perform a data compression, and incompressible LPCM. Although DORUBI digital and LPCM are bit rate immobilization, and an MPEG audio is not so large as a video stream, it can choose from some kinds of sizes per audio frame.

[0026] Such AV data are multiplexed by one stream by the method called an MPEG system. Drawing 37 is drawing showing the MPEG structure of a system. As for a pack header and 42, 41 is [a packet header and 43] pay loads. The MPEG system has the layered structure called a pack and a packet. A packet consists of a packet header 42 and a pay load 43. AV data are divided for every size respectively suitable from a head, and are stored in a pay load 43. As information on AV data stored in the pay load 43, a packet header 42 It stores. A certain data The decoding time of day DTS (Decoding Time Stamp) and display time of day PTS () of the data contained in the pay load written in ID (stream ID) for identifying, and the precision of 90kHz [Presentation] Time Stamp (DTS is omitted when decoding and a display are simultaneously performed like audio data) is recorded. A pack is the unit which adjusted two or more packets. Since in the case of DVD-RAM uses it as one pack for every packet, a pack consists of a pack header 41 and a

packet (a packet header 42 and pay load 43). SCR (SystemClock Reference) which wrote the time of day when the data in this pack are inputted into a decoder buffer in the precision of 27MHz is recorded on a pack header.

[0027] With DVD-RAM, one pack is recorded for such an MPEG system stream as 1 sector (=2048B).

[0028] Next, the decoder which decodes the MPEG system stream mentioned above is explained. Drawing 38 is the decoder model (P-STD) of an MPEG system decoder. STC from which 51 becomes the standard time of day in a decoder (System TimeClock), The demultiplexer to which 52 solves decoding of a system stream, i.e., multiplexing, I in which the input buffer of a video decoder mentioned 53 above, and a video decoder and 55 mentioned 54 above, In order to absorb the difference between the order of data produced between P picture and B picture, and the order of a display I, As for the reorder buffer which stores P picture temporarily, I which 56 has in a reorder buffer, the switch which adjusts the order of an output of P picture and B picture, and 57, the input buffer of an audio decoder and 58 are audio decoders.

[0029] Such an MPEG system decoder processes as follows the MPEG system stream mentioned above. When SCR described by the time of day and the pack header of STC51 is in agreement, a demultiplexer 52 inputs the pack concerned. A demultiplexer 52 decodes the stream ID in a packet header, and transmits the data of a pay load to the decoder buffer for each stream of every. Moreover, PTS and DTS in a packet header are taken out. The video decoder 54 performs ejection decoding for a video buffer 53 to picture data, stores I and P picture in the reorder buffer 55, and carries out the display output of the B picture to the time of day of STC51, and the time of day whose DTS corresponded as it is. When the pictures which the video decoder 54 has decoded are I and a P picture, a switch 56 is leaned to the reorder buffer 55 side, outputs before [in the reorder buffer 55 / I] or P picture, and, in the case of B picture, leans it to the video decoder 54 side. The audio decoder 58 carries out ejection decoding of the data for 1 audio frame from the audio buffer 57 like the video decoder 54 at the time of day of STC51, and the time of day whose PTS (there is no DTS in the case of an audio)

corresponded.

[0030] Next, the multiplexing approach of an MPEG system stream is explained using drawing 39 . In a video frame and drawing 39 (b), a video buffer and drawing 39 (c) show an MPEG system stream, and drawing 39 (d) shows [drawing 39 (a)] audio data, respectively. The axis of abscissa shows the time-axis common to each drawing, and each drawing is drawn on the same time-axis. Moreover, in the condition of a video buffer, an axis of ordinate shows a buffer occupation (the amount of data accumulation of a video buffer), and the thick wire in drawing shows time transition of a buffer occupation. Moreover, the inclination of a thick wire is equivalent to the bit rate of video, and it is shown that data are inputted into the buffer at the fixed rate. Moreover, that the buffer occupation is reduced at fixed spacing shows that data were decoded. Moreover, the intersection of a slanting dotted line and a time-axis shows the data transfer start time to the video buffer of a video frame.

[0031] Henceforth, the complicated image A in a video data is explained to an example. Since Image A needs the amount of signs of a large quantity as drawing 39 (b) shows, the data transfer from the time of day t1 in drawing to a video buffer must be started rather than the decoding time of day of Image A. (The time amount from the data input start time t1 to decoding is called vbv_delay) Consequently, it multiplexes in the location (time of day) of the video pack with which it added shading as AV data. On the other hand, since it is not necessary to bring forward more specially than decoding time of day the audio data transfer which does not need the dynamic amount control of signs like video, it is common that a few is multiplexed [of decoding time of day] in front. Therefore, multiplexing is performed in the condition that the video data precedes by the video data and audio data which are reproduced at the same time of day. In addition, by MPEG, the time amount which can store data into a buffer is limited, and after all the data except still picture data are inputted into a buffer, it is specified must be outputted to a decoder from a buffer within 1 second. Therefore, the gap by multiplexing of a video data and audio data is 1 second (if it says strictly, only the part of the reorder of a video data may shift further) at the maximum.

[0032] In addition, although [this example] video precedes to an audio, on reason, an audio is able to precede to video. When an easy image with high compressibility is prepared for a video data and audio data are transmitted early superfluously, it is possible to make such data intentionally. However, it is that it can precede by constraint of MPEG at the maximum till 1 second.
[0033] (Explanation of a tape) A video tape is explained below. Drawing 40 is drawing showing the relation between a videocassette recorder and a video tape. Since parallel require the record section of each channel of video and an audio independently to the tape transit direction, respectively in the case of a tape as shown in drawing 40 , it can perform recording only an audio easily. Moreover, in the case of the conventional analog system video tape recorder, since it is almost equal to zero, with one head, simultaneously, it can reproduce and the time amount (delay) required by sound recording from playback can record.
[0034]
[Problem(s) to be Solved by the Invention] In DVD-RAM expected as a next-generation AV archive medium, the following technical problems occur, for example.
[0035] The biggest technical problem in the case of postrecording by the DVD recorder originates in the structural difference between that AV data recorded by the DVD recorder are an MPEG stream, and a videocassette recorder and a DVD recorder.
[0036] Each channel of video and an audio is independently recorded on a tape, respectively as the conventional technique explained in the case of the videocassette recorder. Although the after recording (henceforth "postrecording") which records the audio signal to the video image after video image recording from the reasons of there being no delay from playback to sound recording was easily possible, in the case of a DVD recorder, it is recorded as one stream by which video and an audio were multiplexed. The number of the optical pickups which write is one. Since it has the track buffer for realizing a Variable Bit Rate, even if time difference arises from playback by record and it has two optical pickups, each must be able to operate independently. Moreover, even if each optical pickup was able to be operated

independently, when the zone where the fields which each pickup accesses differ was straddled, in DVD-RAM into which rotational speed is changed for every zone, it had the problem that record and playback could not be performed simultaneously.

[0037] Moreover, since the time stump for AV synchronous playback is described that the conventional technique explained by the MPEG stream, when conflict arises between the time stump given to the audio stream recorded later and the time stump given to the existing stream, the case where a decoder stops operating normally arises. For example, when SCR given to the video pack in the existing stream and SCR given to the audio pack recorded later have the same time of day, two data which a decoder should process will exist in the time of day of this SCR simultaneously, it becomes impossible for a decoder to operate normally, and the worst hang-up may be carried out.

[0038] moreover, since the audio stream of various formats is recordable on DVD-RAM, it is unknown whether a DVD recorder can be postrecorded to DVD-RAM recorded elsewhere, and if a stream is not analyzed at the time of a recording start, there is no inside.

[0039] This invention aims at providing with the recording device and approach for such information record intermediation the information record-medium list which realizes easily decision whether it can postrecord in an information record medium like DVD-RAM especially at the time of after recording.

[0040]

[Means for Solving the Problem] The information record medium concerning this invention records the audio stream which can be postrecorded, and audio attribute information including the bit rate information which shows the bit rate of the audio stream.

[0041] Two or more audio streams may be stored in the above-mentioned information record medium. In this case, it is the audio stream of two or more audio streams which at least one can postrecord. Moreover, in order to record the audio data at the time of after recording, the audio stream which records the audio data at the time of after recording is the 2nd audio stream prepared

for every audio stream [the] which records original audio data, and may have the same attribute as the 1st audio stream.

[0042] Moreover, two or more audio streams may be the same per packet except for stream numbers differing.

[0043] The information recording apparatus concerning this invention is an information recording apparatus which postrecords to the audio stream recorded on the above-mentioned information record medium. The information recording apparatus has a prior check means to check whether after recording processing of an information recording apparatus is possible to the audio stream which postrecords, based on audio attribute information, before postrecording.

[0044] A prior check means may consist of a decision means by which an information recording apparatus judges whether encoding processing is possible to said audio stream with reference to the bit rate information within the audio attribute information on the audio stream for after recording with the bit rate, and a judgment means to judge with after recording processing of an information recording apparatus being possible when the encoding processing with the bit rate is possible for an information recording apparatus.

[0045] Moreover, according to the decision result of a decision means, a prior check means may be further equipped with an advice means to notify a user of the purport in which after recording actuation is impossible, when the encoding processing with a bit rate is not possible for an information recording apparatus.

[0046] Moreover, the audio stream for after recording judges whether it is in the condition which can be postrecorded, and a decision means may be made to perform propriety decision of encoding processing of an information processor succeedingly, when an audio stream is in the condition which can be postrecorded.

[0047] Moreover, management information may also include the status information which shows whether an audio stream is in the condition which can be postrecorded. At this time, a decision means can judge whether an audio stream is in the condition which can be postrecorded with reference to that status information.

[0048] Moreover, audio attribute information may also include the coding mode information on an audio stream. In addition to bit rate information, at this time, a decision means can make a propriety judgment of the encoding processing to the audio stream of an information recording apparatus with reference to that coding mode information further.

[0049] The information record approach concerning this invention is the approach of postrecording with an information recording apparatus to the audio stream recorded on the above-mentioned information record medium, and with reference to the bit rate information about the audio stream for after recording, it judges whether encoding processing is possible to an audio stream with the bit rate, and an information recording apparatus performs after recording actuation, when encoding processing of an information recording apparatus is possible.

[0050]

[Embodiment of the Invention] The DVD recorder and DVD-RAM which are 1 operation gestalt of the information record medium applied to this invention with reference to an attached drawing below and an information recording device are explained to a detail.

[0051] <the 1st operation gestalt> (logical organization on DVD-RAM) -- the logical organization on DVD-RAM is first explained using drawing 41 . The data configuration on the disk which appears through a file system as for drawing 41 (a), and drawing 41 (b) show the physical sector on a disk.

[0052] The standard signal required in order for there to be a lead-in groove (Lead in) field in the head part of a physical sector and to stabilize a servo, the recognition signal with other media, etc. are recorded. A data area exists following a lead-in groove field. Effective data are logically recorded on this part. Finally there is a lead-out (Lead out) field, and the same standard signal as a lead-in groove field etc. is recorded. The management information for file systems called volume information is recorded on the head of a data area. Since there is no direct relation to the content of this invention about a file system, the explanation is omitted.

[0053] It enables the data in a disk to treat as a directory or a file by letting a file system pass, as shown in drawing 41 (a). All the data that a DVD recorder

treats are put on the bottom of the VIDEO_RT directory directly under a ROOT directory, as shown in drawing 41 (a). The file which a DVD recorder treats is roughly distinguished by two kinds, and are one management information file and at least one AV file (usually plurality).

[0054] (Management information file) Next drawing 42 (a) is used and the contents of the management information file are explained. The inside of a management information file is roughly divided, and is classified into a VOB table and a PGC table. VOB (Video Object) is the program stream of MPEG, and PGC defines the playback sequence of Cell which makes the partial section (or entire interval) of the arbitration in VOB one logic playback unit. In other words, VOB is one unit which has semantics as MPEG, and PGC is one unit in which a player is reproduced.

[0055] As for a VOB table, the number (Number_of_VOBs) and VOB information on VOB are recorded into it. VOB information consists of AV file name (AV_File_Name) corresponding to VOB, the VOB identifier (VOB_ID) within a disk, the start address (VOB_Start_Address) within AV file, an ending address (VOB_End_Address) within AV file, playback time amount length (VOB_Playback_Time) of VOB, and attribute information (VOB_Attribute) on a stream.

[0056] Stream attribute information field consist of a video attribute (Video_Attribute), an attribute (Audio0_Attribute) of 1 Motome's audio stream, and an attribute (Audio1_Attribute) of 2 Motome's audio stream. The attribute information on an audio stream consists of the coding mode (Coding_Mode), the application flags (Application_Flag), the quantization multipliers (Quantization), the sampling frequencies (Sampling_Frequency), and the numbers (Number_of_channels) of audio channels of an audio.

[0057] As for a PGC table, a PGC number (Number_of_PGCs) and PGC information are recorded into it. PGC information -- the Cell number (Number_of_Cells) in PGC, and every -- it consists of Cell information. VOB_ID to which Cell information corresponds, the playback start time within VOB (Cell_Start_Time), The playback time amount within VOB (Cell_Playback_Time), The playback starting address within VOB (Cell_Start_Address), The playback ending address within VOB

(Cell_End_Address), The audio flag which specifies whether they are an original copy audio or a postrecording audio (after recording audio) for the voice reproduced by the Cell (Audio_Flag), It consists of the playback starting addresses (Cell_Start_Address) and playback ending addresses (Cell_End_Address) for postrecording audios.

[0058] (AV file) Next, AV file is explained using drawing 42 (b). AV file consists of at least one VOB (usually plurality), and VOB is continuously recorded within AV file. VOB in AV file is managed for the VOB information on a management information file mentioned above. A player accesses a management information file first, it is reading the starting address and ending address of VOB, and access to VOB is attained. Moreover, within VOB, Cell (cel) is defined as a logical playback unit. Cell is the partial regeneration section (or entire interval) of VOB, and a user can set it up freely. This Cell enables it to perform simple edit, without operating actual AV data. The access information to Cell is managed within the Cell information in a management information file like VOB. A player accesses a management information file first, it is reading the starting address and ending address of Cell, and access to Cell is attained.

[0059] In order that the address information of Cell may make VOB a standard and the address information of VOB may make AV file a standard, a player accesses AV file by calculating the address information within AV file by adding the address information of VOB to the address information of Cell actually.

[0060] (Structure of VOB) Drawing 43 is drawing showing the configuration of VOB in the gestalt of this operation. Two audio streams are set to audio stream #1 and audio stream #2, respectively. As shown in drawing 43 , the same audio stream is stored in audio stream #1 and audio stream #2.

[0061] The point which should be noted here is not only the same as a stream, and I hear that it is the same per a pack and packet, and there is. Although SCR (System Clock Reference) of a pack header and the stream number of a packet header differ from the value of original_or_copy, the other fields, for example, PTS etc., have the same value, and, of course, the contents of the pay load are the same.

[0062] The fields of original_or_copy differ for describing clearly that it is a dummy stream for after recording about an original copy stream and stream #2 in stream #1 within a stream. The value of this flag may be the same value.
[0063] As shown in drawing 44 , even if it records audio stream of one of the two by after recording by putting such two audio streams into VOB, it is possible to leave one audio data of an original copy.
[0064] If it makes it the same as that of the record section for postrecording, the object which in other words secures a band, and the audio stream which has recorded with the dummy the attribute of the audio stream to postrecord, i.e., coding mode and a bit rate, to put in two audio streams, a pack and a packet header will be completely the same, and it will be because postrecording becomes possible only by replacing the inside of a pay load.
[0065] This means that it is possible it to omit an underflow and that an audio pack must be multiplexed when an audio buffer postrecords so that it may not overflow as for the system encoder of MPEG.
[0066] the case where it is going to postrecord with different coding mode and a different bit rate -- not only the guarantee of a band but an audio buffer -- overflow -- and an audio pack must be replaced so that an underflow may not be carried out. It becomes impossible for this reason, for exchange of an audio pack to guarantee simply between the sets which have a different algorithm.
[0067] So, with the gestalt of this operation, without changing SCR and PTS with the same coding mode and the same bit rate, the data in a pack unit are rewritten so that only the content of the audio pay load may interchange.
[0068] Of course, although the content of SCR, pack headers including PTS, and the packet header may be rewritten, it cannot be overemphasized that the done stream must fulfill the conditions as an MPEG stream.
[0069] Next, it explains why it records the same audio data by stream #1 and stream #2 using drawing 45 .
[0070] For example, when the case where a part of VOB is postrecorded is considered, and the data recorded as stream #2 are silent, for example or it is data of a meaningless content, the data which are meaningless on the boundary of the part which is not as a postrecorded part, and meaningful data

will change.

[0071] By the DVD recorder, since it has only one audio decoder, simultaneous playback of stream #1 and stream #2 cannot be carried out. For this reason, when partial after recording is performed, it is necessary to specify that it changes the audio stream reproduced to a decoder in order to move to the data postrecorded from original data, or original data from the postrecorded data in that boundary section. Since assignment of the audio stream to reproduce generally serves as control from a host side, i.e., a microcomputer, change assignment in a frame unit is difficult.

[0072] Then, as shown in drawing 45 , the boundary section which performed partial after recording also becomes the dummy audio stream itself continuously reproducible by recording the same audio data as original data.

[0073] If the problem at the time of partial postrecording mentioned above is data of the completely same not an audio stream but same content, i.e., the content same as analog data at the time of playback, the above-mentioned problem should be able to be solved. It explains why it records the two same streams thoroughly.

[0074] Since the data which it was once overwritten and were lost cannot be returned to a basis when to want to return the voice which the user postrecorded, namely, to eliminate it is wished after performing partial postrecording for example, it is necessary to rerecord some <thing> or other. When a silent audio stream is recorded temporarily, the problem of partial postrecording at this silent audio stream section mentioned above when the user tried postrecording again further in the partial section will occur.

[0075] Then, as shown in drawing 46 , when a pack and two audio streams same per packet are being used except for SCR and a stream number, the copy in a packet unit can be performed from stream #1 to stream #2, and it is possible for this to return to the original condition. The stream number in a packet header needs to correct at this time.

[0076] (Condition of audio stream #2) Drawing 47 is drawing showing the condition of stream #2 recorded on the after recording mentioned above. The condition of stream #2 is divided into "the same content stream", and "a postrecorded stream" and an "independent stream". ["the same stream",

and] As mentioned above, postrecording from the same stream and the same content stream is possible, but the reverse is possible only when only the case to the same stream returns from the postrecorded audio stream to the same stream.

[0077] Moreover, although postrecording to the whole VOB is possible when it is audio stream #2 on which the independent stream, for example, silent data, was recorded, although it is possible to regard the stream after postrecording as an independent stream, a problem which was mentioned above will produce partial postrecording of VOB.

[0078] On a DVD-RAM disk, it is Application about the above condition. It manages by Flag.

[0079] (Configuration of a DVD recorder) Next, the configuration of a DVD recorder is explained using drawing 48 . As shown in drawing, a DVD recorder consists of the output section 7805 which outputs the input section 7803 which inputs an image and voice including the system control section 7802 and the AD converter which manage management and control of the user interface section 7801 which receives a display and the demand from a user to a user, and the whole, the encoder section 7804, an image, and voice, the decoder section 7806 which decodes an MPEG stream, a track buffer 7807, and drive 7808.

[0080] (Record actuation of a DVD recorder) The record actuation in a DVD recorder is explained. The user interface section 7801 receives the demand from a user first. The user interface section 7802 tells the demand from a user to the system control section 7802, and the system control section 7802 interprets the demand from a user, and it performs a processing demand to each module. When the demand from a user is an image transcription, the system control section 7802 gives an encoding demand to the encoder section 7804.

[0081] The encoder section 7804 encoding [video], encodes [audio-] and encodes [system-] the image and speech information which are sent from the input section 7803, and sends the encoded data to a track buffer 7807.

[0082] Next, the system control section 7802 advances the write request of the data in a track buffer to drive 7808, and drive 7808 records data on

ejection and DVD-RAM from a track buffer.

[0083] The stop demand from a user is told to the system control section 7802 through the user interface section 7801. The system control section 7802 performs an encoding deactivate request in the encoder section 7804, and when an encoder 7804 finishes encoding the data in the middle of encoding, it stops encoding processing, and it tells encoding termination to the system control section 7802.

[0084] Next, the system control section 7802 is written in drive 7808, termination is required, and drive 7808 ends read-out of data and the writing to DVD-RAM, when a track buffer 7807 becomes empty.

[0085] Finally, the system control section 7802 corrects AV file information, clip sequence information, and file system information to recorded VOB, and records them on DVD-RAM through drive 7808. Especially, it is Application. The value of Flag is recorded as same audio stream.

[0086] An important thing is that two audio streams are inserted in VOB outputted to the number of the audio data inputted being one in the encoder section 7804 in this record actuation.

[0087] The processing which inserts two audio streams is explained using drawing 49 . Drawing 49 is drawing showing the configuration of the encoder section. As shown in drawing, the encoder section consists of video encoder 7804a, audio encoder 7804b, and system multiplexer 7804c.

[0088] Video encoder 7804a encodes the video signal inputted to an MPEG video stream, and audio encoder 7804b encodes the audio signal inputted to an audio stream. At this event, the number of audio streams is one. Next, pack-izing of a video stream and an audio stream, packet-izing, and multiplexing are performed by multiplexer 7804c. When performing this multiplexing processing, the copy in an audio pack unit is performed and it multiplexes as two audio streams. In addition, the copy of an audio stream may copy as a pay load, just before packet-izing, a packet level and. Two audio streams are inserted into VOB as mentioned above.

[0089] (After recording actuation of a DVD recorder) The after recording actuation in a DVD recorder is explained below.

[0090] First, I/O of AV data in the case of postrecording by the DVD recorder

is explained. All I/O of AV data writes in by reading in the unit called an AV block. Although it is the thing of the continuation record section described in drawing 35 as the AV block here, when sufficiently large compared with continuation record length required in order that a continuation record section may seek to the next continuation record section temporarily, this continuation record section is divided and it is good also as an AV block.

[0091] Next, a track buffer 7807 is divided here and it treats as the track buffer 1 and track buffer 3 which are used for playback, the track buffer 2 used for record, and a track buffer 4. Drawing 50 described this situation.

[0092] Time series explains the I/O to a track buffer using drawing 52 . As shown in drawing 52 (b), the case where VOB consists of four AV blocks A, B, C, and D is explained to an example.

[0093] Drawing 52 (a) is drawing which expressed the track buffer (TB) 1 and the buffer accumulated dose of 2, 3, and 4 on the time-axis, respectively, and is set to a track buffer 1 (TB1) and a track buffer 3 (TB3). What the amount of data accumulation is increasing is data read from DVD-RAM from the drive, the data input for playback, i.e., an object, and it is reduction by supplying data to the decoder section that the accumulated dose is decreasing conversely.

[0094] On the contrary, in the track buffer 2 (TB2) and the track buffer 4 (TB4), what the amount of data accumulation is increasing is data recorded on the data input after postrecording from the encoder section, i.e., DVD-RAM, (overwrite), and that the accumulated dose is decreasing shows supply to the drive for recording on DVD-RAM.

[0095] First, postrecording is started immediately after read-out of data which reads AV block A to a track buffer 1 during the period T1 in drawing. Postrecording of AV block A is performed during during [Ta] the drawing middle. Since the postrecording data of AV block A are recorded on a track buffer 2, the accumulated dose of a track buffer 2 increases during Period Ta.

[0096] Since AV block A and AV block B with which a drive goes the following AV block B to read immediately after a period T1 do not exist on the same continuation record section, the readout of AV block B is performed after seeking of a head (period T2).

[0097] Postrecording of AV block B is started next after postrecording termination of AV block A (period Tb). The data of AV block B accumulated in the track buffer 3 are supplied to a decoder, and the data postrecorded through the encoder are stored in the track buffer 4 during Period Tb.

[0098] Immediately after postrecording termination of AV block A, a drive goes to overwrite the postrecording data of AV block A accumulated in the track buffer 2 at AV block A (period T3).

[0099] After the overwrite processing to AV block A finishes, a drive reads AV block C next. The data of read AV block C are stored in a track buffer 1 (period T four).

[0100] Postrecording processing can be performed by repeating the above processing and performing it.

[0101] Next, the processing flow in a DVD recorder is explained. The postrecording demand from a user is told to the system control section 7802 through the user interface section 7801. First, the system control section 7802 performs the read-out demand of VOB which postrecords to drive 7808.

[0102] Drive 7808 reads VOB which performs postrecording from DVD-RAM per AV block, and records it on a track buffer 1. The system control section 7802 performs a postrecording processing demand to the encoder section 7804 simultaneously.

[0103] The encoder section 7804 performs audio encoding of the voice data inputted from the input section 7803, reads the audio pack with which audio stream #2 in the stream sent from the decoder section are recorded, transposes it to the postrecording audio stream which encoded the pay load, and is recorded on a track buffer 2. Drawing 51 described this situation.

[0104] After postrecording of AV data stored in the track buffer 1 is completed, the encoder section 7804 starts postrecording of AV data currently succeedingly recorded on the track buffer 3, and tells that postrecording of a track buffer 1 was completed in the system control section 7802.

[0105] Next, the system control section 7802 performs the write request of the data of a track buffer 2 to drive 7808.

[0106] As for drive 7808, overwrite record of the data of a track buffer 2 is carried out after completing the writing to a track buffer 3 at DVD-RAM.

[0107] It can postrecord by carrying out one by one to a track buffer 1, a track buffer 2, a track buffer 3, and a track buffer 4, as the above processing was mentioned above.

[0108] Moreover, drive 7808 tells VOB read-out termination to the system control section 7802, after read-out of VOB from DVD-RAM is completed.

[0109] When postrecording processing is performed and postrecording of all audio data is completed until postrecording of all the audio data with which the system control section 7802 remains in the encoder section 7804, and a broth and the encoder section 7804 remain the postrecording termination demand in the track buffer 1 and the track buffer 3 is completed, postrecording termination is told to the system control section 7802.

[0110] Next, the system control section 7802 is written in to drive 7808, requires a post process, and drive 7808 carries out overwrite record of all the VOB data that remain in the track buffer 2 and the track buffer 4 at a DVD-RAM disk, and it tells postrecording processing termination to the system control section 7802 after record termination.

[0111] The system control section 7802 is Application. Flag is changed into postrecording activation ending and it rerecords on DVD-RAM through drive 7808.

[0112] (Playback actuation of a DVD recorder) Next, the playback actuation in a DVD recorder is explained. The regeneration demand from a user is told to the system control section 7802 through the user interface section 7801. The system control section 7802 gives the read-out demand of VOB to drive 7808, and drive 7808 reads VOB data from DVD-RAM, and it sends it to a track buffer 7807.

[0113] Next, the system control section 7802 gives the playback demand of VOB to the decoder section 7806, and the decoder section 7806 reads data from a track buffer 7807, and performs decoding, and it outputs it through the output section 7805.

[0114] After drive 7808 ends read-out of VOB, it reads to the system control section 7802, termination is told, and the system control section 7802 gives a playback termination demand to a decoder 7806. A decoder 7806 performs read-out and decoding of data until the data of a track buffer 7807 become

empty, and it tells the system control section 7802 about playback termination after decoding termination of all data.

[0115] When an important thing has the change demand of an audio stream, i.e., the playback demand of audio stream #2, from a user at this time, the system control section 7802 is Application. When the value of Flag shows the same audio stream or the same audio contents, it is notifying it being unable to change to a user through the user interface section 7801, without reproducing audio stream #2.

[0116] To audio stream #2, the same audio stream When the same audio contents are recorded, or performing an error message to a user Although a user expects that the audio different from audio stream #1 will be reproduced and the audio stream is changed Since in the case of this condition the completely same audio is reproduced even if it changes to audio stream #2, a user is for the change having gone wrong, namely, considering as if the DVD recorder was out of order.

[0117] In addition, in the gestalt of this operation, although audio stream #2 were made into the dummy audio stream for postrecording, audio stream #1 is good also as a dummy audio stream for postrecording.

[0118] Moreover, in the gestalt of this operation, although the pay load in a packet is in agreement between two audio streams, you may be the same as an audio stream or the same content currently recorded on VOB which the sizes of the packet-ized audio data may differ and is done.

[0119] Moreover, in the gestalt of this operation, between the audio packets which correspond between two audio streams may be restricted if the audio pack of audio stream #1 surely comes previously, and the audio pack of audio stream #2 may be arranged immediately after the audio pack of audio stream #1. Thus, it becomes easy to find the audio pack of audio stream #2 by preparing a limit at the time of postrecording. Moreover, of course, limit attachment ** is not cared about, either, as audio stream #2 precede with audio stream #1.

[0120] moreover, Application Flag -- taking -- a value -- ****** -- " -- the same -- a stream -- " -- " -- the same -- a content -- a stream -- " -- " -- postrecording -- finishing -- a stream -- " -- " -- independent -- a stream -- " -- four -- a kind -- it

is -- ** -- having carried out -- although -- " -- the same -- a stream -- " -- " -- the same -- a content -- a stream -- " -- as one condition -- you may treat -- "a postrecorded stream" and a "independent stream" -- as one condition -- you may treat . Moreover, "the same stream", the "same content stream", and "a postrecorded stream" may be treated as one condition.

[0121] Moreover, in explanation of postrecording of operation, although the example with four track buffers was shown, a track buffer 1, a track buffer 2 and a track buffer 3, and a track buffer 4 are made to share, respectively, and it may be made to overwrite AV data.

[0122] <the 2nd operation gestalt> -- the 1st operation gestalt enabled it to realize the difficult postrecording function by conventional DVD and a conventional DVD recorder. However, by DVD and the DVD recorder, it still has the following problems.

[0123] That is, unlike the conventional tape media, in DVD, making record possible by various audio stream formats makes after recording by the DVD recorder difficult.

[0124] If it explains concretely, AC-3, an MPEG audio, and Linear PCM are large, and, as for an audio stream recordable on DVD, three kinds of formats exist. Moreover, each format also has the number of record channels, and various modes, such as a record bit rate.

[0125] On the other hand, in the common audio encoder, the thing corresponding to all the encoding modes and numbers of channels, and bit rates is very rare, and supports only the suitable mode for every goods target. That is, if the audio stream which starts postrecording actually or is recorded was not analyzed when it was going to postrecord to the disk recorded by the DVD recorder of the other place, it had the problem which is not understood whether it can postrecord or not.

[0126] So, with this operation gestalt, it has the description in the record actuation at the time of postrecording with how having the management information on a disk on the basis of the configuration of the 1st operation gestalt, while. Below, it explains focusing on the difference from the 1st operation gestalt.

[0127] (Logical organization on DVD-RAM) The logical organization on DVD-

RAM is first explained using drawing 1 . Drawing 1 indicates the data configuration on the disk which appears through a file system to be a physical sector address on a disk. All the data that a DVD recorder treats as shown in drawing 1 are put on the bottom of the DVD_RTR directory directly under a ROOT directory.

[0128] The file which a DVD recorder treats is roughly distinguished by two kinds, and are one management information file and at least one AV file (usually plurality). The RTR_MOV.VRO file which records an animation, and an animation and a still picture and the RTR_STO.VRO file that records the voice data recorded to coincidence are included in AV file.

[0129] Drawing 2 is the block diagram of the RTR_MOV.VRO file which recorded the animation. As shown in drawing 2 , M_VOB (animation object: Movie Video Object) which is the program stream of MPEG is arranged in order of an image transcription at a RTR_MOV.VRO file.

[0130] Moreover, M_VOB consists of VOBU(s) [unit / one] (video object unit: Video ObjectUnit) on the basis of the playback time amount of video in 1.0 seconds from 0.4 seconds.

[0131] VOBU consists of V_PCK (video pack), A_PCK (audio pack), and SP_PCK (subpicture pack), and each pack is constituted per 2KB.

[0132] Moreover, the video data in VOBU consists of at least one or more GOP(s) (Group of Pictures). In GOP, it is the decoding unit of MPEG video, and consists of two or more P and a B picture by making I picture into a head.

[0133] Drawing 3 is the block diagram of the RTR_STO.VRO file which recorded a still picture and voice data. As shown in drawing 3 , S_VOB (still-picture object: Still Picture Video Object) which is an MPEG program stream for still pictures is arranged in order of an image transcription at a RTR_STO.VRO file.

[0134] The big difference from M_VOB is that a video data and voice data of each other are not multiplexed except that still picture data are recorded instead of the video data, and voice data (Audio part) is recorded following still picture data (Video part).

[0135] Moreover, S_VOB consists of one VOBU and VOBU consists of V_PCK, A_PCK, and SP_PCK.

[0136] (AV data and management information) Next, the relation between M_VOB and S_VOB which were mentioned above using drawing 4 , and management information is explained.

[0137] Two kinds, M_VOB for dynamic images and S_VOB for static images, exist in AV data as already explained. As for M_VOB, the attribute information on M_VOB that management information (M_VOBI) exists and corresponds to M_VOBI is recorded for each M_VOB of every. In S_VOB, if it manages for each S_VOB of every, since the amount of management information will increase, management information (S_VOGI) exists in every [which made two or more S_VOB the lump] group (S_VOG). The attribute information of the corresponding group of S_VOB is recorded on S_VOGI.

[0138] By the data of an MPEG stream, it is important that there is no linearity between time amount and the amount of data here. As spread previously, since compression using the compression approach which used the time amount correlation property in order to realize efficient compression, and the variable-length sign approach called VBR is performed, by the MPEG stream, time amount and the amount of data, i.e., address information, do not correspond to a meaning.

[0139] Then, at M_VOBI, it has a filter (TMAP) for changing time amount and the address, and has the filter (S_VOB Entries) for changing the still picture number and the address within a group by S_VOGI.

[0140] Next, the management information of a playback sequence is explained. A playback sequence is specified as a sequence (PGC) of the cel which shows the partial section or the entire interval of M_VOB and S_VOG.

[0141] As for this playback sequence, a user chooses a favorite thing from the original copy PGC which refers to all AV data in a disk, and AV data in a disk, and two kinds of the custom PGC (it is possible to define more than one) which defined playback sequence exist.

[0142] The former original copy PGC has the layer which is also called a program set (Program Set) and is called the program (Program) which bundled two or more cels logically in between. The latter custom PGC is also called a play list (PlayList), and, unlike the original copy PGC, in between, does not have Program.

[0143] (Management information file) Next, drawing 33 is used from drawing 5 , and the contents of management information file"RTR.IFO" are explained.
[0144] "RTR_VMG" (drawing 5)
In the RTR.IFO file, the management information called RTR_VMG (real-time record video management) is recorded. This RTR_VMG consists of RTR_VMGI, M_AVFIT, S_AVFIT, ORG_PGCI, UD_PGCIT, TXTDT_MG, and seven tables of MNFIT.
[0145] Next, the detail of each above-mentioned table is explained.
"RTR_VMGI" (drawing 6)
RTR_VMGI (real-time record video management information) consists of VMGI_MAT and PL_SRPT.
[0146] "VMGI_MAT" (drawing 6)
The following information is recorded as information concerning [VMGI_MAT (video management information managed table)] an entire disk. VMGI_MAT is read first and a player and a recorder can obtain the rough configuration information of a disk. VMGI_MAT consists of the following information.
[0147] VMG_ID (video management identifier)
Identifier"DVD_RTR_VMG0" which shows that video recording data are recorded on this disk is recorded.
 [0148] RTR_VMG_EA (RTR_VMG ending address)
The ending address of RTR_VMG is recorded.
[0149] VMGI_EA (VMGI ending address)
The ending address of VMGI is recorded.
[0150] VERN (version number)
The version number of a record format of this video recording data is recorded according to the format of drawing 7 .
[0151] TM_ZONE (time zone)
The time zone which all the time information currently recorded in this disk uses is recorded. It consists of TZ_TY (time zone type) which shows whether TM_ZONE uses the Greenwich mean time which is universal time of day about the criteria of time information as it is shown in drawing 7 , or the standard time for every area is used, and TZ_OFFSET (time zone offset) which records time difference with Greenwich mean time.

[0152] STILL_TM (stere time amount)

The quiescence time amount length at the time of displaying a sound-less still picture is recorded.

[0153] CHRS (character-sets code for primary texts)

The character-sets code for primary texts mentioned later is recorded.

[0154] M_AVFIT_SA (M_AVFIT starting address)

The starting address of M_AVFIT is recorded. When accessing M_AVFIT, it seeks to this starting address.

[0155] S_AVFIT_SA (S_AVFIT starting address)

The starting address of S_AVFIT is recorded. When accessing S_AVFIT, it seeks to this starting address.

[0156] ORG_PGCI_SA (ORG_PGCI starting address)

The starting address of ORG_PGCI is recorded. When accessing ORG_PGCI, it seeks to this starting address.

[0157] UD_PGCIT_SA (UD_PGCIT starting address)

The starting address of UD_PGCIT is recorded. When accessing UD_PGCIT, it seeks to this starting address.

[0158] TXTDT_MG_SA (TXTDT_MG starting address)

The starting address of TXTDT_MG is recorded. When accessing TXTDT_MG, it seeks to this starting address.

[0159] MNFIT_SA (MNFIT starting address)

The starting address of MNFIT is recorded. When accessing MNFIT, it seeks to this starting address.

[0160] "PL_SRPT" (drawing 8)

PL_SRPT (play list search pointer table) is a table which consists of PL_SRPTI and n PL_SRP.

[0161] "PL_SRPTI" (drawing 8)

The following information for accessing PL_SRP is recorded on PL_SRPTI (play list search pointer table information).

[0162] PL_SRP_Ns (PL_SRP number)

The number of PL_SRP is recorded.

[0163] PL_SRPT_EA (PL_SRPT ending address)

The ending address of this PL_SRPT is recorded.

[0164] "PL_SRP" (drawing 8)
Moreover, the following information for accessing the custom PGC which is live data of this play list is recorded on PL_SRP (play list search pointer).
[0165] PL_TY (play list type)
As a value which identifies the type of this play list, it is recorded according to the description format it is indicated to be to drawing 9 following any they are. 0000b : Only an animation is 0001b. : Only a still picture is 0010b. : An animation, still picture mixture [0166] PGCN (PGC number)
The number of PGC corresponding to this play list is recorded. A PGC number is the order of record of the PGC information within UD_PGCIT mentioned later.
[0167] PL_CREATE_TM (play list record time)
The time information which created this play list is recorded according to the description format shown in drawing 9 .
[0168] PRM_TXTI (primary text information)
The text information which shows the content of this play list is recorded. For example, a program name is recorded when a TV program is recorded on videotape. Moreover, this primary text information consists of the field for ASCII codes, and the field for character code sets specified by CHRS mentioned above.
[0169] IT_TXT_SRPN (IT_TXT_SRP number)
When option record of the information which shows the content of this play list is carried out as IT_TXT in addition to the primary text mentioned above, the number of IT_TXT_SRP is recorded as a link information to IT_TXT recorded in TXTDT_MG. An IT_TXT_SRP number is the order of record within TXTDT_MG mentioned later.
[0170] THM_PTRI (thumbnail pointer information)
The thumbnail information representing this play list is described.
[0171] "THM_PTRI" (drawing 8)
The following information that THM_PTRI shows the location of a thumbnail is recorded.
[0172] CN (cel number)
The cel number containing a thumbnail is recorded. A cel number is the order

of record of the cel information in UD_PGCI to which this play list corresponds.

[0173] THM_PT (thumbnail point)

When the cel which CN mentioned above shows is an animation cel, the display time of day of the video frame used as a thumbnail according to the PTM description format shown in drawing 10 is recorded. PTM is given according to the conventional time of the time stump described in the MPEG program stream.

[0174] Moreover, when the cel which CN mentioned above shows is a still picture cel, the still picture VOB entry number of the static image used as a thumbnail according to the S_VOB_ENTN description format shown in drawing 11 is recorded. A still picture VOB entry number is the order of record of the still picture VOB entry within the still picture VOB group whom this cel shows.

[0175] "M_AVFIT" (drawing 12)

The management information corresponding to animation AV file"RTR_MOV.VRO" is recorded, and M_AVFIT (animation AV file information table) consists of M_AVFITI, M_VOB_STI, and M_AVFI.

[0176] "M_AVFITI" (drawing 12)

The information on the following required in order that M_AVFITI (animation AV file information table information) may access M_VOB_STI and M_AVFI is recorded.

[0177] M_AVFI_Ns (the number of animation AV file information)

The number of the fields of the AVFI information which follows is shown, in the case of "0", it is shown that AVFI does not exist, and, in the case of "1", it is shown that AVFI exists. Moreover, the existence of AVFI also supports the existence of RTR_MOV.VRO which is AV file for animations.

[0178] M_VOB_STI_Ns (the number of M_VOB_STI)

The number of the fields of M_VOB_STI which follows is shown.

[0179] M_AVFIT_EA (M_AVFIT ending address)

The ending address of M_AVFIT is recorded.

[0180] "M_VOB_STI" (drawing 12)

The information on the following [M_VOB_STI / (animation VOB stream information)] as stream information on Animation VOB is recorded.

[0181] V_ATR (video attribute)
The video attribute information described below is recorded according to the format of drawing 13 .
[0182]
Video compression It is recorded any of the following values which identify mode video compress mode they are.
00b : MPEG-101b : MPEG-2[0183] TV It is recorded any of the following values which identify a system television system they are.
00b : 525/60(NTSC
01b : 625/50(PAL)
[0184] Aspect It is recorded any of the following values which identify a ratio resolution ratio they are.
00b : 4x301b : 16x9 [0185] It is recorded any of the following values which identify whether the closed caption data for the line21_switch_1 fields 1 are recorded into the video stream they are.
1b : 0b currently recorded : [0186] which is not recorded It is recorded any of the following values which identify whether the closed caption data for the line21_switch_2 fields 2 are recorded into the video stream they are.
1b : 0b currently recorded : [0187] which is not recorded Video It is recorded any of the following values which identify resolution video resolution they are.
000b : 720x480 (NTSC), 720x576 (PAL)
001b : 702x480 (NTSC), 702x576 (PAL)
010b : 352x480 (NTSC), 352x576 (PAL)
011b : 352x240 (NTSC), 352x288 (PAL)
100b : 544x480 (NTSC), 544x576 (PAL)
101b : 480x480 (NTSC), 480x576 (PAL)
[0188] AST_Ns (the number of audio streams)
The number of audio streams currently recorded on corresponding VOB is recorded.
[0189] SPST_Ns (the number of subpicture streams)
The number of subpicture streams currently recorded on corresponding VOB is recorded.
[0190] A_ATR0 (attribute of the audio stream 0)

The following audio attribute information corresponding to the audio stream 0 (it corresponds to the above-mentioned audio stream **1) is recorded according to the format of drawing 13 .

[0191] Audio coding It is recorded any of the following values which identify the compression method of a mode audio they are.

000b : DORUBI AC-3001b : Extended-stream-less MPEG audio 010b : MPEG audio 011with extended stream b : Linear PCM [0192] Application It is recorded any of the following values which identify Flag application information they are.

00b : Non-corresponding 01b : Number mixture of audio channels 10b : With auxiliary voice [0193] At the time of a Quantization/DRCMPEG audio activity, it is recorded any of the following values which identify the existence of DRC (dynamic range control) information they are.

00b : DRC data are 01b which is not contained in the MPEG stream. : DRC data are [0194] contained in the MPEG stream. Moreover, the following values which identify Quantization are recorded at the time of a LPCM audio activity.

00b : 16 bits [0195] The following values which identify fs sampling frequency are recorded.

00b : 48kHz [0196]

Number of Audio It is recorded any of the following values which identify the number of channels audio channels they are.

0000b : One channel (monophonic recording)

0001b : Two channels (stereo)

0010b : Three-channel 0011b : Four-channel 0100b : Five-channel 0101b : Six-channel 0110b : Seven-channel 0111b : Eight-channel 1001b : Two channels (dual monophonic recording)

[0197] Which value of the following which identifies a Bitrate bit rate is recorded.

0000 0001b : 64kbps0000 0010b : 89kbps0000 0011b : 96kbps0000 0100b : 112kbps0000 0101b : 128kbps0000 0110b : 160kbps0000 0111b : 192kbps0000 1000b : 224kbps0000 1001b : 256kbps0000 1010b : 320kbps0000 1011b : 384kbps0000 1100b : 448kbps0000 1101b :

768kbps0000 1110b : 1536 kbps important one here When a corresponding audio stream is an MPEG audio stream with an extended stream, it is recording only the bit rate of the basic stream except an extended stream. Because, an extended stream is because an expression is impossible in the bit rate of immobilization which was described above in order to perform compression which used the variable-length sign method.

[0198] A_ATR1 (attribute of the audio stream 1)

The following audio attribute information corresponding to the audio stream 1 (it corresponds to the above-mentioned audio stream **2 with which postrecording was provided) is recorded according to the format of drawing 13 . Each field is the same as that of A_ATR0 mentioned above.

[0199] SP_ATR (subpicture attribute)

The subpicture attribute information described below is recorded according to the format of drawing 14 .

[0200] Application It is recorded any of the following values which identify Flag application information they are.

00b : Non-corresponding 01b : Title 10b : Animation [0201] SP_PLT (subpicture color palette)

The color palette information for subpictures is recorded according to the format of drawing 14 .

[0202] "M_AVFI" (drawing 15)

M_AVFI (animation AV file information) consists of information required in order to access Animation VOB, M_AVFI_GI, M_VOBI_SRP, and M_VOBI.

[0203] "M_AVFI_GI" (drawing 15)

M_VOBI_SRP_Ns is recorded on M_AVFI_GI (animation AV file information general information).

[0204] M_VOBI_SRP_Ns (the number of animation VOB information search pointers)

The number of M_VOBI_SRP is recorded.

[0205] "M_VOBI_SRP" (drawing 15)

The address information for accessing to each M_VOBI is recorded on M_VOBI_SRP (animation VOB information search pointer).

[0206] M_VOBI_SA (animation VOB information starting address)

What is necessary is just to seek to the address shown here, when the starting address of M_VOBI is recorded and it performs access to the VOB information concerned.

[0207] "M_VOBI" (drawing 16)

M_VOBI (animation VOB information) consists of the management information of Animation VOB, M_VOB_GI, SMLI, AGAPI, TMAPI, and CP_MNGI.

[0208] "M_VOB_GI" (drawing 16)

The following information is recorded on M_VOB_GI (animation VOB general information) as general information of Animation VOB.

[0209] VOB_TY (VOB type)

The attribute information on VOB is recorded according to the format shown in drawing 17 .

[0210] It is recorded any of the following values which identify the condition of VOB of TE ** they are.

0b : Normal-state 1b : Momentary elimination condition [0211] It is recorded any of the following values which identify the condition of the A0_STATUS audio stream 0 they are.

00b : Original copy condition 01b : the condition of rewriting -- here, an "original copy condition" shows that it continues being in a condition when data are first written in in the audio stream 0, and "the condition of rewriting" shows the condition that original data were rewritten.

[0212] It is recorded any of the following values which identify the condition of the A1_STATUS audio stream 1 they are.

00b : -- the condition postrecord [ ] -- here, "the dummy condition for postrecording" shows the condition that postrecording data are not yet recorded when the audio stream 1 is formed as an object for postrecording, and "the condition postrecord" shows the condition that postrecording data were rewritten. Original copy condition 01b : Condition of rewriting 10b : Dummy condition 11for postrecording b : In addition, it may be prepared on the assumption that the audio stream 1 is not used for postrecording, and for this reason, the "original copy condition" and the "condition of rewriting" are also defined.

[0213] It is recorded any of the following values which identify APS analog anti-copying signal-control information they are.
00b : APS-less 01b : Type 110b : Type 211b : Type 3 [0214] SML_FLG -- it is recorded any of the following values which identify whether seamless playback of this VOB is carried out with the last VOB they are.
0b : Seamless playback improper 1b : Seamless playback C [0215] It is recorded any [the existence of the audio playback gap in the A0_GAP_LOC audio stream 0 and] of the following values which show VOBU by which the audio playback gap section is multiplexed they are.
00b : With no audio playback gap 01b : An audio playback gap multiplexes at the Head VOBU. 10b : An audio playback gap multiplexes to the 2nd VOBU. 11b : An audio playback gap is multiplexing [0216] to the 3rd VOBU. It is recorded any [the existence of the audio playback gap in the A1_GAP_LOC audio stream 1 and] of the following values which show VOBU by which the audio playback gap section is multiplexed they are.
00b : With no audio playback gap 01b : An audio playback gap multiplexes at the Head VOBU. 10b : An audio playback gap multiplexes to the 2nd VOBU. 11b : An audio playback gap is multiplexing [0217] to the 3rd VOBU.
VOB_REC_TM (VOB record time)
The time which recorded this VOB is recorded in the same format as PL_CREATE_TM shown in drawing 9 . Record time is that the record time of the display video frame of a VOB head is shown, and it is important that this VOB_REC_TM must also be corrected when a VOB head video frame replaces by edit or partial elimination here. Moreover, it is possible to ask by adding the progress time of day within VOB to VOB_REC_TM to display record time used [a camcorder / try] synchronizing with playback of VOB.
[0218] VOB_REC_TM_SUB (VOB record time difference information)
It is the field for absorbing the error of VOB_REC_TM corrected by edit to VOB, and partial elimination when a VOB head video frame replaces. Since it cannot take out sufficient record precision only with VOB_REC_TM when edit or elimination in a frame or field precision is performed since VOB_REC_TM has only the information by the date time second with it as it was shown in drawing 9 , it records a fraction using this field.

[0219] M_VOB_STIN (M_VOB_STI number)
This M_VOB_STI number to which VOB corresponds is recorded. The M_VOB#STI number shown here is the order of record within the M_VOB_STI table mentioned above.
[0220] VOB_V_S_PTM (VOB video initiation PTM)
This display start time of VOB is recorded by the same conventional time as the time stump in a stream.
[0221] VOB_V_E_PTM (VOB video termination PTM)
This display end time of VOB is recorded by the same conventional time as the time stump in a stream. As for being careful here, the time of day when it added the display period of the frame concerned to display end time, i.e., display start time, in VOB_V_E_PTM although the time stump in a stream showed the display start time of the frame concerned is recorded.
[0222] "SMLI" (drawing 16)
The following information which is needed when carrying out seamless playback with the last VOB is recorded on SMLI (seamless information). Moreover, this field exists, only when "1b" is recorded on SML_FLG mentioned above.
[0223] VOB_FIRST_SCR (VOB head SCR)
SCR of the pack of the VOB beginning concerned is recorded.
[0224] PREV_VOB_LAST_SCR (before VOB last SCR)
SCR of the pack of the before VOB last is recorded.
[0225] "AGAPI" (drawing 16)
The information on the following required in order to process an audio playback gap by the decoder is recorded on AGAPI (audio gap information). Moreover, this field exists, when values other than "00b" are recorded on one of A0_GAP_LOC or A1_GAP_LOC which were mentioned above.
[0226] VOB_A_STP_PTM (VOB audio stop PTM)
The audio playback gap, i.e., the time of day when a decoder suspends audio playback temporarily, is recorded by the same conventional time as the time stump in a stream.
[0227] VOB_A_GAP_LEN (VOB audio gap length)
The time amount length of an audio playback gap is recorded in the precision

of 90kHz.

[0228] "CP_MNGI" (drawing 16)

CP_MNGI (copy management information) consists of the copy management information and CPG_STATUS to this VOB, and CPGI.

[0229] CPG_STATUS (copy defense condition)

As the VOB copy defense condition concerned, the "copy free-lancer" and the value which identifies "time cost copy-ization" are recorded.

[0230] CPGI (copy defense information)

The copy defense information applied to the VOB concerned is recorded.

[0231] "TMAPI" (drawing 18)

TMPAI (time map information) consists of TMAP_GI, TM_ENT, and VOBU_ENT.

[0232] "TMAP_GI" (drawing 18)

TMAP_GI (TMAP general information) consists of TM_ENT_Ns, VOBU_ENT_Ns, TM_OFS, and ADR_OFS, and each field is as follows.

[0233] TM_ENT_Ns (TM_ENT number)

The number of the fields of TM_ENT mentioned later is recorded.

[0234] VOBU_ENT_Ns (VOBU_ENT number)

The number of the fields of VOBU_ENT mentioned later is recorded.

[0235] TM_OFS (time offset)

The offset value of a time map is recorded in video field precision.

[0236] ADR_OFS (address offset)

The offset value within AV file of the VOB head concerned is recorded.

[0237] "TM_ENT" (drawing 18)

TM_ENT (time entry) consists of the following fields as access point information for every fixed spacing TMU. In the case of NTSC, in the 600 video field (NTSC) and PAL, TMU is the 500 video field.

[0238] VOBU_ENTN (VOBU_ENT number)

The entry number of VOBU containing the time of day (TMUx(N-1)+TM_OFS when it is Nth TM_ENT) which this TM_ENT shows is recorded.

[0239] TM_DIFF (time difference)

The difference of the display start time of VOBU which the time of day which this TM_ENT shows, and VOBU_ENTN mentioned above show is recorded.

[0240] VOBU_ADR (VOBU address)
The start address within VOB of VOBU which VOBU_ENTN mentioned above shows is recorded.
[0241] "VOBU_ENT" (drawing 19)
The following configuration information of corresponding VOBU is recorded on VOBU_ENT (VOBU entry) in the format shown in drawing 19 . It is possible to obtain time of day required in order to access to desired VOBU, and address information by adding the subsequent fields in order.
[0242] The number of packs from 1 STREF_SZVOBU head pack to the pack containing the last data of the head I picture in VOBU is recorded.
[0243] The playback time amount length of VOBU of VOBU_PB_TM ** is recorded.
[0244] VOBU_SZ -- the amount of data of this VOBU is recorded.
[0245] "S_AVFIT" (drawing 20)
The management information corresponding to still picture AV file"RTR_STO.VRO" is recorded, and S_AVFIT (still picture AV file information table) consists of S_AVFITI, S_VOB_STI, and S_AVFI.
[0246] "S_AVFITI" (drawing 20)
The information on the following required in order that S_AVFITI (still picture AV file information table information) may access S_VOB_STI and S_AVFI is recorded.
[0247] S_AVFI_Ns (the number of still picture AV file information)
"0" or "1" is recorded as a S_AVFI number. This value supports the number of still picture AV files, i.e., the existence of a RTR_STO.VRO file.
[0248] S_VOB_STI_Ns (still picture VOB stream information number)
The number of S_VOB_STI mentioned later is recorded.
[0249] S_AVFI_EA (still picture AV file information ending address)
The ending address of S_AVFI is recorded.
[0250] "S_VOB_STI" (drawing 20)
The information on the following [S_VOB_STI / (still picture VOB stream information)] as stream information on a still picture VOB is recorded.
[0251] V_ATR (video attribute)
As video attribute information, it is Video. compression mode, TV system,

Aspect ratio, Video resolution is recorded. Each field is the same as that of V_ATR in M_VOB_STI mentioned above.

[0252] OA_ATR (audio stream attribute)

As audio stream attribute information, it is Audio. coding mode, Application Flag, Quantization/DRC, fs, Number of Audio channels is recorded. Each field is the same as that of A_ATR0 in M_VOB_STI mentioned above.

[0253] SP_ATR (subpicture attribute)

As subpicture attribute information, it is Application. Flag is recorded. The field concerned is the same as that of SP_ATR in M_VOB_STI mentioned above.

[0254] SP_PLT (subpicture color palette)

The color palette information for subpictures is recorded. The record format is the same as that of SP_PLT in M_VOB_STI mentioned above.

[0255] "S_AVFI" (drawing 23)

S_AVFI (still picture AV file information) consists of information required in order to access a still picture VOG, S_AVFI_GI, S_VOGI_SRP, and S_VOGI.

[0256] "S_AVFI_GI" (drawing 23)

S_VOGI_SRP_Ns is recorded on S_AVFI_GI (still picture AV file information general information).

[0257] S_VOGI_SRP_Ns (the number of still picture VOB group search pointers)

The number of the fields of S_VOGI_SRP mentioned later is recorded.

[0258] "S_VOGI_SRP" (drawing 23)

S_VOGI_SRP (S_VOGI_SA is recorded on the still picture VOB group information search pointer.)

[0259] The starting address of this S_VOGI is recorded on S_VOGI_SA (still picture VOB group information starting address).

[0260] "S_VOGI" (drawing 23)

S_VOGI (still picture VOB group information) consists of the management information of a still picture VOB, S_VOG_GI, S_VOB_ENT, and CP_MNGI.

[0261] "S_VOG_GI" (drawing 23)

The following information is recorded on S_VOG_GI (still picture VOB group general information) as a still picture VOB group's general information.

[0262] S_VOB_Ns (still picture VOB number)

The still picture VOB number in a still picture VOB group is recorded.
[0263] S_VOB_STIN (S_VOB_STI number)
The S_VOB_STI number on which the stream information on a still picture VOB is recorded is recorded. A S_VOB_STI number is the order of record within the S_VOB_STI table mentioned above.
[0264] FIRST_VOB_REC_TM (head VOB image transcription time)
The image transcription time information on the head still picture VOB in this still picture VOB group is recorded.
[0265] LAST_VOB_REC_TM (last VOB image transcription time)
The image transcription time information on the last still picture VOB in this still picture VOB group is recorded.
[0266] S_VOB_SA (still picture VOB group starting address)
The starting address of the still picture VOB group within a RTR_STO.VRO file is recorded.
[0267] The copy management information concerning ["CP_MNGI" CP_MNGI (copy management information)] the still picture VOB group concerned is recorded. Each field is the same as that of CP_MNGI of M_VOBI mentioned above.
[0268] "S_VOB_ENT" (drawing 24)
S_VOB_ENT (still picture VOB entry) corresponds to each still picture VOB in a still picture VOB group, and is divided into Type A and Type B of the following [audio existence].
[0269] "S_VOB_ENT (Type A)" (drawing 24)
Type A consists of S_VOB_ENT_TY and V_PART_SZ and each field is as follows.
[0270] S_VOB_ENT_TY (still picture VOB entry type)
The type information on this still picture VOB is recorded in the format shown in drawing 25 .
[0271] It is recorded any of the following values which identify the MAP_TY type A or Type B they are.
00b : Type A01b : Type B [0272] It is recorded any of the following values which identify the condition of the still picture VOB of TE ** they are.
0b : Normal-state 1b : Momentary elimination condition [0273] The number of

subpicture streams in this SPST_Ns still picture VOB is recorded.

[0274] V_PART_SZ (video PERT size)

The amount of data of this still picture VOB is recorded.

"S_VOB_ENT (Type B)" (drawing 24)

Type B has A_PART_SZ and A_PB_TM other than S_VOB_ENT_TY and V_PART_SZ**, and each field is as follows.

[0275] S_VOB_ENT_TY (still picture VOB entry type)

The type information on this still picture VOB is recorded. Each field is the same as that of Type A mentioned above.

[0276] V_PART_SZ (video PERT size)

The amount of data of the video PERT in this still picture VOB is recorded.

[0277] A_PART_SZ (audio PERT size)

The amount of data of Audie OPART in this still picture VOB is recorded.

[0278] A_PB_TM (audio playback time amount)

The playback time amount length of Audie OPART in this still picture VOB is recorded.

[0279] "UD_PGCIT" (drawing 26)

UD_PGCIT (custom PGC information table) consists of UD_PGCITI, UD_PGCI_SRP, and UD_PGCI.

[0280] "UD_PGCITI" (drawing 26)

The following information that UD_PGCITI (custom PGC information table information) constitutes a custom PGC information table is recorded.

[0281] UD_PGCI_SRP_Ns (the number of custom PGC information search pointers)

The UD_PGCI_SRP number is recorded.

[0282] UD_PGCIT_EA (custom PGC information table ending address)

The ending address of UD_PGCIT is recorded.

[0283] "UD_PGCI_SRP" (drawing 26)

UD_PGCI_SA is recorded on UD_PGCI_SRP (custom PGC information search pointer).

[0284] UD_PGCI_SA (custom PGC information starting address)

What is necessary is just to seek to the address currently recorded in UD_PGCI_SA, when the starting address of UD_PGCI is recorded and it

accesses this PGCI.

[0285] "UD_PGCI" (drawing 26)

PGCI mentioned later explains the detail of UD_PGCI (custom PGC information).

[0286] "O_PGCI" (drawing 5)

PGCI mentioned later explains the detail of O_PGCI (original copy PGC information).

[0287] "TXTDT_MG" (drawing 27)

TXTDT_MG (text data management) consists of TXTDTI, IT_TXT_SRP, and IT_TXT. Each field is as follows.

[0288] "TXTDTI" (drawing 27)

TXTDTI (text data information) consists of CHRS, IT_TXT_SRP_Ns, and TXTDT_MG_EA.

[0289] CHRS (character-sets code)

The character-sets code used by IT_TXT is recorded.

[0290] IT_TXT_SRP_Ns (the number of IT_TXT search pointers)

The IT_TXT_SRP number is recorded.

[0291] TXTDT_MG_EA (text data management ending address)

The ending address of TXTDT_MG is recorded.

[0292] "IT_TXT_SRP" (drawing 27)

The following are recorded on IT_TXT_SRP (IT_TXT search pointer) as access information to corresponding IT_TXT.

[0293] IT_TXT_SA (IT_TXT starting address)

The starting address of IT_TXT is recorded. What is necessary is just to seek to this address, when accessing this IT_TXT.

[0294] IT_TXT_SZ (IT_TXT size)

The data size of IT_TXT is recorded. Only this size should read data to read this IT_TXT.

[0295] "IT_TXT" (drawing 27)

IT_TXT consists of the plurality or one set which made one set TXT (text) and TMCD (termination code) corresponding to IDCD (identification code) and IDCD. When there is no TXT corresponding to IDCD, it omits and is good also considering IDCD and TMCD as one set. Moreover, IDCD is specified as

follows.
genre code 30h animation 34h : sport 35h : documentary 36h : Art [news 37h : / weather 38h : / educational 39h : / hobby 3Ah : / entertainment 3Bh :] : 31h of films : 32h of music : Drama 33h (theater, opera) : 3Ch : Shopping input source code 60h : 61h of broadcasting stations : Camcorder 62h : 63h of photographs : Memorandum 64h : In addition to this, it is [0296]. "PGCI" (drawing 28)
PGCI (PGC information) has DS common to O_PGCI and UD_PGCI, and consists of PGC_GI, PGI, CI_SRP, and a CI.
[0297] "PGC_GI" (drawing 28)
PGC_GI (PGC general information) consists of PG_Ns and CI_SRP_Ns as information on general PGC. Each field is as follows.
[0298] PG_Ns (the number of programs)
The number of programs in this PGC is recorded. Since it cannot have a program in the case of custom PGC, as for this field, "0" is recorded.
[0299] CI_SRP_Ns (CI_SRP number)
The number of CI_SRP mentioned later is recorded.
[0300] "PGI" (drawing 28)
PGI (program information) consists of PG_TY, C_Ns, PRM_TXTI, IT_TXT_SRPN, and THM_PTRI. Each field is as follows.
[0301] PG_TY (program type)
The following information which shows the condition of this program is recorded using the format shown in drawing 29 .
Protect (protection)
0b: Normal-state 1b: Protection condition C_Ns (the number of cels)
The number of cels within this program is described.
[0302] PRM_TXTI (primary text information)
The text information which shows the content of this program is recorded. For details, it is the same as that of PL_SRPT mentioned above.
[0303] IT_TXT_SRPN (IT_TXT_SRP number)
By making into IT_TXT information which shows the content of this program in addition to the primary text mentioned above, when option record is carried out, the number of IT_TXT_SRP currently recorded in TXTDT_MG is recorded

on this field.

[0304] THM_PTRI (thumbnail pointer information)

The thumbnail information representing this program is described. The detail of THM_PTRI is the same as that of THM_PTRI of PL_SRPT mentioned above.

[0305] "CI_SRP" (drawing 28)

The address information for accessing CI_SRP (cel information search pointer) to this cel information is recorded.

[0306] CI_SA (cel information starting address)

The starting address of this cel information is recorded. What is necessary is just to seek to this address, when accessing to this cel.

[0307] "CI" (drawing 30)

CI (cel information) is classified into M_CI for animations, and S_CI for still pictures.

[0308] "M_CI" (drawing 30)

M_CI (animation cel information) consists of M_C_GI and M_C_EPI.

[0309] "M_C_GI" (drawing 30)

M_C_GI (animation cel general information) has the following basic information which constitutes a cel.

[0310] C_TY (cel type)

The following information for identifying an animation cel and a still picture cel is recorded in the format shown in drawing 31 .

[0311] C_TY1000b : Animation cel 001b : Still picture cel [0312] M_VOBI_SRPN (animation VOB information search pointer number)

The search pointer number of the animation VOB information that this cel corresponds is recorded. When accessing to the stream data with which this cel corresponds, it accesses to the animation VOB information search pointer number which this field points out first.

[0313] C_EPI_Ns (cel entry point information number)

The number of the entry points which exist in this cel is recorded.

[0314] C_V_S_PTM (cel video start time)

The playback start time of this cel is recorded in the format shown in drawing 10 .

[0315] C_V_E_PTM (cel video end time)

The playback end time of this cel is recorded in the format shown in drawing 10 . The effective section of the cel within VOB to which this cel corresponds is specified using C_V_S_PTM and C_V_E_PTM.

[0316] "M_C_EPI" (drawing 32)

M_C_EPI (animation cel entry point information) is classified into Type A and Type B according to the existence of a primary text.

[0317] "M_C_EPI (Type A)" (drawing 32)

M_C_EPI (Type A) consists of the following information which shows an entry point.

[0318] EP_TY (entry point type)

The following information that the type of this entry point is identified is recorded according to the format shown in drawing 33 .

EP_TY100b : Type A01b : Type B [0319] EP_PTM (entry point time of day)

The time of day when the entry point is placed is recorded according to the format shown in drawing 10 .

[0320] "M_C_EPI (Type B)" (drawing 32)

M_C_EPI (Type B) has PRM_TXTI described in the following other than EP_TY and EP_PTM which Type A has.

[0321] PRM_TXTI (primary text information)

The text information which shows the content of the location which this entry point shows is recorded. For details, it is the same as that of PL_SRPT mentioned above.

[0322] "S_CI" (drawing 30)

S_CI (still picture cel information) consists of S_C_GI and S_C_EPI.

[0323] "S_C_GI" (drawing 30)

S_C_GI (still picture cel general information) has the following basic information which constitutes a cel.

[0324] C_TY (cel type)

The information for identifying an animation cel and a still picture cel is recorded. For details, it is as the animation cel mentioned above.

[0325] S_VOGI_SRPN (still picture VOB group information search pointer number)

The search pointer number of still picture VOB group information to which this cel corresponds is recorded. When accessing to the stream data with which this cel corresponds, it accesses to the still picture VOB group information search pointer number which this field points out first.

[0326] C_EPI_Ns (cel entry point information number)

The number of the entry points which exist in this cel is recorded.

[0327] S_S_VOB_ENTN (initiation still picture VOB number)

The playback initiation still picture VOB number of this cel is recorded in the format shown in drawing 11 . A still picture VOB number is the sequence within S_VOG which S_VOGI_SRPN mentioned above shows.

[0328] E_S_VOB_ENTN (termination still picture VOB number)

The playback termination still picture VOB number of this cel is recorded in the format shown in drawing 11 . A still picture VOB number is the sequence within S_VOG which S_VOGI_SRPN mentioned above shows. In addition, the effective section of the cel within S_VOG to which this cel corresponds is specified using S_S_VOB_ENTN and E_S_VOB_ENTN.

[0329] "S_C_EPI" (drawing 32)

S_C_EPI (still picture cel entry point information) is classified into Type A and Type B according to the existence of a primary text.

[0330] "S_C_EPI (Type A)" (drawing 32)

S_C_EPI (Type A) consists of the following information which shows an entry point.

[0331] EP_TY (entry point type)

The following information that the type of this entry point is identified is recorded according to the format shown in drawing 33 .

[0332] EP_TY100b : Type A01b : Type BS_VOB_ENTN (still picture VOB entry number)

It is recorded according to the format which shows the still picture number on which the entry point is put to ****11 .

[0333] "S_C_EPI (Type B)" (drawing 32)

S_C_EPI (Type B) has PRM_TXTI described in the following other than EP_TY and S_VOB_ENTN which Type A has.

[0334] PRM_TXTI (primary text information)

The text information which shows the content of the location which this entry point shows is recorded. For details, it is the same as that of PL_SRPT mentioned above.

[0335] (DVD recorder) Next, a DVD recorder is explained. Although the configuration of the DVD recorder of this operation gestalt is the same as the 1st operation gestalt and basic target, as shown in drawing 53 , the system control section 7802 equips the interior with the postrecording prior check section 78021.

[0336] Although actuation of a DVD recorder is fundamentally the same as the 1st operation gestalt, when postrecording, confirming in advance whether to have the capacity for himself to postrecord by the postrecording prior check section 78021 differ greatly.

[0337] Although explanation of DS also described, the optical disk of this operation gestalt has the bit rate (Bitrate) information other than audio coding mode (Audio coding mode) information and the number (Number of Audio channels) information of the Audie channels as an attribute of a dummy audio stream recorded on postrecording.

[0338] A DVD recorder confirms in advance whether postrecording can do itself using the audio stream for dummies using this audio attribute information.

[0339] Specifically, it is confirmed in advance whether, as compared with the encoding capacity of a DVD recorder, postrecording actuation is possible in the audio coding mode currently recorded on A_ATR1 (refer to drawing 12) of M_VOB_STI, the number of audio channels, and a bit rate.

[0340] When it postrecords like [when it is judged that postrecording actuation is possible] the case of the 1st operation gestalt and it is judged that postrecording is impossible, the purport a user cannot do postrecording through the user interface section 7801 is notified by the predetermined approach (for example, message indicator). The flow chart of drawing 56 is used for below from drawing 54 , and the actuation at this time is concretely explained to it.

[0341] If there are directions of postrecording actuation from a user to the program (PG) through a user interface 7801 first as shown in drawing 54 (S1), the system control section 7802 will read the animation VOB information

(M_VOBI) and animation VOB stream information (M_VOB_STI) corresponding to the directed program (PG) (S2). Then, with reference to M_VOBI and M_VOB_STI, it judges whether postrecording actuation is possible (S3). As a result of judging, if postrecording actuation is possible, (S4) and postrecording actuation will be started (S5), and if postrecording actuation is impossible, (S4) and a user will be notified of the purport in which postrecording actuation is impossible (S6). (for example, message indicator)

[0342] Propriety decision (S3) of the above-mentioned postrecording actuation is performed as follows according to the flow chart shown in drawing 55 . The number of an audio stream is checked based on AST_Ns (refer to drawing 12) of M_VOB_STI (S31). If there are two audio streams (S32), the attribute of each audio stream will be checked and it will judge whether those audio streams are in the condition which can be postrecorded (S33). The detail of this processing is mentioned later. If an audio stream is in the condition which can be postrecorded as a result of checking (S34), the coding mode (Audio coding mode) (refer to drawing 13) of A_ATR1 of M_VOB_STI will be checked (S35). If the encoder section of a DVD recorder supports the coding mode (S36) (i.e., if encoding processing with the coding mode is possible) next, the bit rate (Bitrate) (refer to drawing 13) of A_ATR1 of M_VOB_STI will be checked (S37). If the encoder section supports the bit rate (S38) (i.e., if the encoding processing with the bit rate is possible), it will judge with it being "possible [postrecording actuation]" (S39). If the encoder section does not support the bit rate (S38), it judges with it being "impossible [postrecording actuation]" (S40).

[0343] Decision (S33) of the attribute of an audio stream is performed as follows according to the flow chart shown in drawing 56 . First, it judges whether A1_STATUS (refer to drawing 17) about the audio stream for postrecording (audio stream 2) is in "the dummy condition for postrecording", or it is "10b" (S321). If A1_STATUS is in "the dummy condition for postrecording", it will be judged that the audio stream is in the condition which can be postrecorded (S322). Here, the audio stream is prepared for postrecording and "the dummy condition for postrecording" shows the condition that postrecording data are not yet recorded. When A1_STATUS is

not in "the dummy condition for postrecording", the purport which has data [finishing / postrecording / already] to a user is notified, and it waits for the response from a user (S323). If there is a response (directions) of the purport which performs postrecording from a user (S324), suppose that the audio stream is in the condition which can be postrecorded (S322). If there are directions of a postrecording termination from a user (S324), the audio stream will presuppose that it is not in the condition which can be postrecorded (S325).

[0344] Whenever the DVD recorder of this operation gestalt records dynamic-image data, it creates corresponding management information and records audio coding mode, the number of audio channels, and bit rate information on creation and an optical disk as attribute information on an audio stream especially.

[0345] In addition, with this operation gestalt, although explained as a recorder for DVD-RAM, this invention is not limited to DVD-RAM, and if it is a rewritable disk, it can be adapted [this invention].

[0346] Moreover, with the gestalt of this operation, although the detail of the record DS on a disk was described, this invention is not restricted to the DS mentioned above, and having audio attribute information including a bit rate, and when the recorder to postrecord measures its own [audio attribute information and] audio encoding capacity including a bit rate in advance, it can be realized. Moreover, although this operation gestalt explained the case where the number of audio streams was two to the example, even if it is the case where one is recorded, the effectiveness explained with this operation gestalt and the same effectiveness can be acquired by using bit rate information.

[0347]

[Effect of the Invention] According to this invention, an information record medium records the attribute information on the audio stream which included bit rate information at least. Moreover, since an information recording apparatus judges good/no of after recording actuation from such an information record medium with reference to the bit rate information included in audio attribute information, before it performs after recording processing

actually, it can judge the propriety of after recording actuation. For this reason, for example, when the after recording actuation after judging the propriety of after recording actuation is impossible for an information recording apparatus, warning can be emitted to a user.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Disk logical organization drawing in the 2nd operation gestalt.

[Drawing 2] The block diagram in AV file for animations.

[Drawing 3] The block diagram in AV file for still pictures.

[Drawing 4] AV data and related drawing of management information.

[Drawing 5] RTR_VMG block diagram.

[Drawing 6] RTR_VMGI block diagram.

[Drawing 7] VERN and the format explanatory view of TM_ZONE.

[Drawing 8] PL_SRP block diagram.

[Drawing 9] PL_TY and the format explanatory view of PL_CREATE.

[Drawing 10] PTM record format explanatory view.

[Drawing 11] S_VOB_ENTN record format explanatory view.

[Drawing 12] M_AVFIT block diagram.

[Drawing 13] V_ATR and an A_ATR format explanatory view.

[Drawing 14] SP_ATR for animations, and a SP_PLT format explanatory view.

[Drawing 15] M_AVFI block diagram.

[Drawing 16] M_VOBI block diagram.

[Drawing 17] VOB_TY format explanatory view.

[Drawing 18] TMAPI block diagram.

[Drawing 19] VOBU_ENT format explanatory view.

[Drawing 20] S_AVFIT block diagram.

[Drawing 21] V_ATR and an OA_ATR format explanatory view.

[Drawing 22] SP_ATR for still pictures, and a SP_PLT format explanatory view.

[Drawing 23] S_AVFI block diagram.

[Drawing 24] S_VOB_ENT block diagram.

[Drawing 25] S_VOB_ENT_TY format explanatory view.

[Drawing 26] UD_PGCIT block diagram.

[Drawing 27] TXTDT_MG block diagram.

[Drawing 28] PGCI block diagram.

[Drawing 29] PG_TY format explanatory view.

[Drawing 30] CI block diagram.

[Drawing 31] C_TY format explanatory view.

[Drawing 32] C_EPI block diagram.

[Drawing 33] EP_TY1 format explanatory view.

[Drawing 34] The drive equipment block diagram of a DVD recorder.

[Drawing 35] The address space on a disk, and the explanatory view of the amount of data accumulation in a track buffer.

[Drawing 36] The picture correlation diagram in an MPEG video stream.

[Drawing 37] The block diagram of an MPEG system stream.

[Drawing 38] The block diagram of an MPEG system decoder (P-STD).

[Drawing 39] The explanatory view of a video data, a video buffer, an MPEG system stream, and audio data.

[Drawing 40] The explanatory view of the record section on a tape.

[Drawing 41] The explanatory view of the physical arrangement on directory structure and a disk.

[Drawing 42] The explanatory view of management information data and stream data.

[Drawing 43] The block diagram of the MPEG stream which has a band for postrecording.

[Drawing 44] The explanatory view of the postrecording data exchange approach to an MPEG stream.

[Drawing 45] The explanatory view of partial postrecording.

[Drawing 46] The explanatory view of postrecording redo.

[Drawing 47] The state transition diagram of an audio stream.

[Drawing 48] The block diagram of a DVD recorder.

[Drawing 49] Encoder block diagram.

[Drawing 50] The block diagram of the DVD recorder which has four track buffers.

[Drawing 51] The explanatory view of the postrecording processing in an encoder.

[Drawing 52] The timing chart of a track buffer.

[Drawing 53] The block diagram of the system control section.

[Drawing 54] The flow chart which shows the processing at the time of postrecording of the DVD recorder in the 2nd operation gestalt.

[Drawing 55] The flow chart which shows the postrecording actuation propriety decision processing in the processing at the time of postrecording.

[Drawing 56] The flow chart which shows attribute decision processing of the audio stream in postrecording actuation propriety decision processing.

[Description of Notations]

11 Optical Pickup

12 ECC Processing Section

13 Track Buffer

14 Switch

15 Encoder Section

16 Decoder Section

41 Pack Header

42 Packet Header

43 Pay Load

51 STC

52 Demultiplexer

53 Video Buffer

54 Video Decoder

55 Reorder Buffer

56 Switch

57 Audio Buffer

58 Audio Decoder

7801 User Interface Section

7802 System Control Section

7803 Input Section

7804 Encoder Section

7805 Output Section

7806 Decoder Section

7807 Track Buffer

7808 Drive

78021 Postrecording prior check section
